

## The Experiment Of Multiple Plant Ratio And The Organic Fertilizer Addition In The Oyster Mushrooms (*Pleurotus Ostreatus*) Growth And Production

Kun Rawan Sari, Umar Battong dan Saharuddin \*)

STIPER Muhammadiyah Tanah Grogot Kabupaten Paser (Kal-Tim)

Jln. Pangeran Menteri no. 96, Phone 0543-24104 Fax. 23206 Tanah Grogot, Paser

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**Abstract:** Oyster mushroom cultivation plants are very potential. Research on planting media and organic fertilizer use has not been conducted frequently. The experiment done by conducting difference ratio of planting medium and addition of organic fertilizer. The experimental design was Random Complete Design (RAL) with two factorials and three repetition. The first factor was using the first treatment of 3: 2: 1 planting media ratio, the second treatment of 2: 2: 1 planting media ratio, the third treatment of planting ratio of 4: 2: 1. The second factor used the first treatment without the addition of organic fertilizer, the second treatment using 5% of organic fertilizer, the third treatment using 10% of organic fertilizer, and the fourth treatment using 15% of organic fertilizer from the total amount of planting medium. The experimental results showed the real interaction between planting medium and organic fertilizer (goat dung) on growth parameters of mycelium 2, 4, 6 mts, white oyster mushroom length, growth and production in the first, second and third harvest. Based on the result of the research, the effect of planting medium and organic fertilizer combination a1p1, a1p2, a1p3 and a1p4, because the treatment above in average weight of mushroom produced higher outgrowth than other treatments

**Keywords:** planting medium, organic fertilizer, white oyster mushroom (*Pleurotus ostreatus*)

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### I. Introduction

One of agriculture production which is prospective and potential is white oyster mushroom cultivation (*Pleurotus ostreatus*). Firstly, the fulfillment of human being daily need through the consumption of mushroom is only from natural availability. By this way, the amount of mushroom that can be got is limited and only in rainy season, due to in Indonesia the mushroom only can grow in rainy season. The mushroom cultivation for consumption conducts when the need of mushroom significant increases, whereas the supply from nature is limited. Due to observation, research and study in depth about its cultivation, human being succeed to produce mushroom in great amount to fulfill the human being need in consuming mushroom.

This research used different medium composition as a comparison or ratio which composition can show the oyster mushroom growth in the best way. Organic fertilizer addition in this research, partly or mostly which from animal dung or plantation waste by mean process to be formed as dense or liquid medium, can be used to produced nutrient to fix physical, chemical, biological soil quality.

This research aim to know the ratio interaction between planting medium and organic fertilizer through oyster growth and production. Moreover to analyze how oyster mushroom growth is, if the ratio of planting medium is being distinguished.

### II. Research Methode

This research was held in the Second Campus of STIPER Muhammadiyah, Jl. D. I. Panjaitan, Desa Jone, Kec. Tanah Grogot, Kab. PASER, it was started in Mei 2017 to August 2017.

The substances used were sawdust, dolomite, bran, organic fertilizer (goat dung), garlic, ginger, alcohol 70%, spiritus liquid and water. Meanwhile the materials used were steamed barrel, hand sprayer, baglog plastic, firewood, ring baglog, scale, water hose, sack, thermometer, gauge, spatula, spiritus lamp/candle, wire screen, bucket, shovel, pin set, tarp, cotton, awl wood baglog.

The research design used was random complete design with two factorial research and three repetitions. The first factor was planting medium (A) with three level, they were a1 = planting medium containsawdust, bran, dolomite 3 : 2 : 1, a2 = planting medium contain, sawdust, bran, dolomite, 2 : 2 : 1, a3 = planting medium containsawdust, bran, dolomite, 4 : 2 : 1. The second factor was organic fertilizer (goat dung) (P) : p1 = without organic fertilizer, p2 = with 5% organic fertilizer additin (goat dung), p3 = with 10% organic

fertilizer (goat dung), p4 = with 15 % organic fertilizer addition (goat dung), the treatment combination were a1p1 a2p1 a3p1, a1p2 a2p2 a3p2, a1p3 a2p3 a3p3, a1p4 a2p4 a3p4.

The experiment include Mycelium growth, the plant length, the amount of mushroom cap, the age of mushroom to harvest, the mushroom cap diameter, the age of harvest time, and the mushroom weight.

### III. Result And Discussion

#### Mycelium Growth

##### 1. Two Weeks after Planting

The variance showed the the interaction planting medium treatment (A) and organic fertilizer (P) were affected, AxP is affected through Mycelium growth average 2 MST. Shown in Tabel 1.

**Tabel 1.** Two weeks after planting :

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	6,74a	---cm---7,11a	4,96b	5,02b	5,96
a2 (2.2.1)	5,18b	4,67b	4,82a	5,18b	4,96
a3 (4.2.1)	4,67b	4,82b	6,74a	6,31a	5,63
Average**	5,53	5,53	5,49	5,503	5,52

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 1.57)

##### 2. Four Weeks after Planting

The variance showed the interaction planting medium treatment (A) and organic fertilizer (P) were affected, AxP is affected through Mycelium growth average 4 MST. Shown in Tabel 2.

**Tabel 2.** Four weeks after planting :

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	10,81d	----cm----	14,7bc	14,76bc	13,59
a2 (2.2.1)	13,62bcd	18,98a	12,96cd	13,62bcd	15,41
a3 (4.2.1)	18,98a	12,96cd	16,94ab	13,3cd	15,55
Average**	14,47	15,35	15,82	13,893	14,88

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 3.34)

##### 3. Six Weeks after Planting

The variance showed the interaction planting medium treatment (A) and organic fertilizer (P) were affected, AxP is affected through Mycelium growth average 6 MST. Shown in Tabel 2.

**Tabel 3.** Six weeks after planting:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(Control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	15,56c	----cm----	18,04b	16,46bc	15,37c
a2 (2.2.1)	20,89a	21,74a	21,22a	20,89a	21,19
a3 (4.2.1)	21,74a	21,22a	21,43a	21,37a	21,44
Average**	19,39	20,33	19,70	19,210	19,66

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 2.47)

**The Mushroom Length (Cm)**

**1. The mushroom length in the first harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through plant average length in the first harvest. Showed in Tabel 4

**Tabel 4.** The mushroom length in the first harvest:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	19,33a	14,27b	15,08b	15,21 ab	15,97
a2 (2.2.1)	15,47 ab	15,66 ab	16,03 ab	15,47 ab	15,66
a3 (4.2.1)	15,66 ab	16,03 ab	16,09 ab	18,29 ab	16,52
Average**	16,82	15,32	15,73	16,323	16,05

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 4.25)

**2. The mushroom length in the second harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through plant average length in the first harvest. Showed in Tabel 5

**Tabel 5.** The mushroom length in the second harvest:

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Planting Media	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	18,82 a	----cm----	16,69 ab	17,18 ab	17,01
a2 (2.2.1)	16,77 ab	16,02 ab	15,13b	16,77 ab	16,17
a3 (4.2.1)	16,02 ab	15,13b	16,09 ab	18,29 ab	16,38
Average**	17,20	15,50	15,97	17,413	16,52

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 3,41).

**1. The mushroom length in the third harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through plant average length in the first harvest. Showed in Tabel 6

**Tabel 6.** The mushroom length in the third harvest:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	18,58 a	----cm----	15,76 ab	16,01 ab	16,33
a2 (2.2.1)	16,58 ab	15,64 ab	15,12b	16,58 ab	15,98
a3 (4.2.1)	15,64 ab	15,12b	15,66 ab	16,17 ab	15,65
Average**	16,93	15,24	15,51	16,253	15,99

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 3,36).

**The amount of mushroom cap in the first harvest**

**1. The amount of mushroom cap in the first harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average amount of mushroom cap in the first harvest. The result is showed in the Tabel 7.

**Tabel 7.** The amount of mushroom cap in the first harverst:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	10 a	--Tdnng-- 8 ab	5 b	6 ab	7
a2 (2.2.1)	4b	7 ab	6 ab	4b	5
a3 (4.2.1)	7 ab	6 ab	5 ab	7 ab	6
Average**	7	7	5	6	6

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 4,93)

**2. The amount of mushroom cap in the second harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average amount of mushroom cap in the second harvest. The result is showed in the Tabel 8.

**Tabel 8.** The amount of mushroom cap in the second harverst:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	8 ab	--Tdnng-- 10 a	6b	7 ab	8
a2 (2.2.1)	5b	9 ab	7 ab	5b	7
a3 (4.2.1)	9 ab	7 ab	5b	5b	6
Average**	7	8	6	6	7

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 3.01).

**3. The amount of mushroom cap in the third harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average amount of mushroom cap in the third harvest. The result is showed in the Tabel 9.

**Tabel 9.** The amount of mushroom cap in the third harverst:

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	9 a	--Tdnng-- 9 a	4b	5b	7
a2 (2.2.1)	5b	8 ab	6b	5b	6
a3 (4.2.1)	8 ab	6b	5b	7 ab	7
Average**	7	8	5	5	7

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 2,91)

**The experiment of mushroom average age to spring from baglog (day)**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average age the mushroom spring from baglog. It is showed in the Table 10

**Tabel 10.** The experiment of mushroom average age it spring from baglog (day):

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	164b	--Hari-- 118 h	169a	159 c	153
a2 (2.2.1)	160c	124g	125f	139d	137
a3 (4.2.1)	137e	126 f	118h	139 d	130
Average**	154	123	137	146	140

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 1.74)

**Experiment of mushroom Averageage to first harvest (day)**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average age the mushroom to the first harvest. It is showed in the Table 11

**Tabel 11.** The experiment of mushroom average age to first harvest (day):

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	--Hari-- p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	153 b	160 a	144c	116e	153
a2 (2.2.1)	122de	111ef	117e	122de	118
a3 (4.2.1)	111ef	117e	108 f	130d	117
Average**	129	128	123	137	129

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 11,68)

**The experiment of average mushroom cap diameter (Cm)**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the averagemushroom cap diameter. It is shoew in the Table 12.

**Tabel 12.** The experiment of average mushroom cap diameter (Cm) :

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	4,95b	---Cm--- 4,94b	7,15 ab	9,37a	6,60
a2 (2.2.1)	7,25 ab	5,09b	6,89 ab	7,25 ab	6,62
a3 (4.2.1)	5,09b	6,89 ab	7,09 ab	7,3ab	6,59
Average**	5,76	5,64	7,04	7,973	6,61

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 4,06).

**The experiment of the mushroom average weight in the first harvest (Gram)**

**1. The mushroom weight in the first harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average mushroom weight in the first harvest. It is showed in the Table 13.

**Tabel 13. Mushroom weight in the first harvest**

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	--gram-- p2(5%)	p3(10%)	p4(15%)	
a1 (3.2.1)	149,44a	114,69b	75,89 cd	76,33 cd	104,09
a2 (2.2.1)	71,56 d	83 cd	83,1cd	71,56 d	77,31
a3 (4.2.1)	83 cd	83,11cd	71d	93c	82,53
Average**	101,33	93,60	76,67	80,29	87,97

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 19,20)

**1. The mushroom weight in the second harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average mushroom weight in the second harvest. It is showed in the Table 14.

**Tabel 14. Mushroom weight in the second harvest**

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (control)	42,89d	--gram-- 116a	71,89bc	73,89bc	101,17
a2 (2.2.1)	67,89c	80,44bc	80,06bc	67,89c	74,07
a3 (4.2.1)	80,44bc	80,06bc	68,11c	90,22b	79,71
Average**	97,07	92,17	73,35	77,33	84,98

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 20,82)

**2. The mushroom weight in the third harvest**

Based on the variance showed that interaction planting medium treatment (A) and organic fertilizer were affected, AxP was affected through the average mushroom weight in the third harvest. It is showed in the Table 15.

**Tabel 15. Mushroom weight in the third harvest**

Planting Medium	Organic Fertilizer				Average*
	(P)				
(A)	p1(control)	p2(5%)	p3(10%)	p4(15%)	
a1 (control)	145,56 a	--Gram-- 105 b	73,72c	71,19c	98,87
a2 (2.2.1)	65,17c	77,67c	77,06c	65,17c	71,27
a3 (4.2.1)	77,67c	77,06c	65c	86,33b	76,52
Average**	96,13**	86,58**	71,93*	74,23*	82,22

\*\* Average number which followed by the same letter showed there is no difference with 5% BNT experiment (BNT NP = 19,83).

#### IV. Discussion

##### THE Effect of Planting Medium

The Analysis result of the Planting Medium variance grant the real affect through the average Mycelium growth at 2, 4, 6 mts after planting the mushroom seeds in the baglog, through mushroom length, the amount of mushroom cap, the mushroom age to spring from logbag, the age of mushroom to be ready to harvest, the mushroom cap diameter, and it's weight that can be produced. This can be caused by treatment on planting medium which have better structure for micro organism activity to change the organic to be better nutrient.

The experiment of BNT 0,05 showed that Planting Medium, sawdust, bran, and dolomid produced the mushroom growth as well as in the real medium in the nature. It is due to the medium composition which is appropriate with the real medium in the nature. In accord as Aditya Rial (2009) said that the real medium of mushroom growth in the nature is the rotten woods.

The condition of mushroom house, weather, room temperature and humidity can impact to the mushroom growth, it is due to oyster mushroom normally grow at 22 C – 28 C and 70% humidity (Aditya Rial 2009).

##### Organic Fertilizer Impact (Goat Dung)

Analisis result of variance showed that it has the real affect. It can be seen from Mycelium growth, 2, 4, 6 mst, through mushroom length, the amount of mushroom cap, the age of mushroom spring from the logbag, the mushroom age to harvest, the mushroom cap diameter and the mushroom weight which is got higher than if it doesn't use the organic fertilizer. Fospor Element is really needed for the mushroom in the Mycelium growth phase, 2, 4, 6, and the next phase in the form of stalk growth as well as the mushroom cap. Organic Fertilizer has the complex nutrient element (N, P, K) as well as micro element that needed by the mushroom also can accelerate the mushroom growth.

##### Interaction Effect

The result of variance showed that the interaction between Planting Medium and Organic Fertilizer (Goat dung) treatment do not have the real effect through oyster mushroom growth and production.

Interaction between Planting Medium and Organic Fertilizer towards all mushroom parameter measured gave the interaction between the two variable. It can be expected that Planting Medium as a primary factor for mushroom growth need secondary factor in the shape of nutrient element. Organic Fertilizer treatment helped the nutrient element supply needed. Organic Fertilizer given, provides micro and macro nutrient element such as NPK and other micro element that can be got from the organic fertilizer in this research. According to Soeging (1982) that Planting Medium supported by nutrient element supply needed can accelerate root, stalk as well as cap of the mushroom growth.

#### V. Conclusion And Suggestion

##### CONCLUSION

According to the result of the experimental reserch of different ratio between Planting Medium and Organic Fertilizer (Goat Dung) addition through oyster mushroom (*Pleurotus ostreatus*) growth and production can be seen as follow :

1. Planting Medium can give the real effect through Mycelium growth in the sixth week after planting the mushroom seeds, it can be seen from the difference mushroom length in the first harvest, the amount of mushroom cap in the second harvest, the mushroom weight in the first second and third harvest, as well as the mushroom cap diameter.
2. Organic Fertilizer (Goat Dung) concentrate have the real effect towards Mycelium growth in the sixth week after planting the mushroom seeds, it can be seen from mushroom length in the first harvest, the amount of mushroom cap in the second and third harvest, the mushroom weight in the first second and third harvest.
3. It can be conclude that there was real interaction between Planting Medium and Organic Fertilizer (goat dung) towards Mycelium 2, 4, 6 mts growth parameter that can be showed in the mushroom length as well as oyster mushroom growth and production in the first second and third harvest.

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